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(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2003/0152488 A1**
Tonkovich et al. (43) **Pub. Date: Aug. 14, 2003**(54) **METHODS OF MAKING DEVICES BY
STACKING SHEETS AND PROCESSES OF
CONDUCTING UNIT OPERATIONS USING
SUCH DEVICES****Publication Classification**(51) **Int. Cl.⁷** **B32B 3/10; C10J 1/00**
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Frank S. Rosenberg
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Moraga, CA 94556 (US)(21) **Appl. No.:** **10/076,915**(22) **Filed:** **Feb. 14, 2002**(57) **ABSTRACT**

New designs, methods and processes are described that in which laminated devices and configured in a style named the "ortho" style. To form a device in the ortho style, plates or sheets are machined to have apertures and then stacked together such that the apertures connect and fluid can flow through the device in a direction that is substantially parallel to the direction of sheet thickness. Various laminated devices and processes using them are also described. For example, devices in which non-rectangular microchannels conform around reaction chambers or other bodies that need to be heated or cooled, are described. Features that separate or trip boundary layer and enhance heat transfer are also described.

